

CLAIMS:

1                   1.    A method for providing enhanced slice  
2   prediction comprising:  
3                    receiving an input containing first and  
4   second data, wherein the first and second data have  
5   different bit rates and are defined by the same  $n$  level  
6   constellation;  
7                    decoding only the second data with a decoder;  
8                    producing an output in response to the input  
9   and the decoder, wherein the output is confined to at  
10   least one but fewer than  $n/2$  of the  $n$  constellation  
11   levels, and wherein  $n > 2$ ; and,  
12                   providing the output as the enhanced slice  
13   prediction.

1                   2.    The method of claim 1 wherein the  
2   decoder is a first decoder, wherein the receiving of an  
3   input comprises decoding the input with a second  
4   decoder to recover the first and second data, wherein  
5   the second decoder has  $n$  states, wherein the producing

6 of an output comprises choosing  $n/4$  states out of  $n/2$   
7 states of the  $n$  states of the second decoder, and  
8 wherein the providing of the output comprises providing  
9 the  $n/4$  states as the enhanced slice prediction.

1 3. The method of claim 2 further comprising  
2 delaying the selection of the  $n/4$  states based upon a  
3 processing time of the second decoder.

1 4. The method of claim 1 wherein  $n$  is  
2 eight, wherein the decoder is a first decoder, wherein  
3 the receiving of an input comprises decoding the input  
4 with a second decoder to recover the first and second  
5 data, wherein the second decoder has eight states,  
6 wherein the producing of an output comprises choosing  
7 only two states out of four states of the eight states  
8 of the second decoder, and wherein the providing of the  
9 output comprises providing the two states as the  
10 enhanced slice prediction.

1           5.    The method of claim 4 further comprising  
2    delaying the selection of the two states based upon a  
3    processing time of the second decoder.

1           6.    The method of claim 1 wherein n is  
2    eight, wherein the decoder is a first decoder, wherein  
3    the receiving of an input comprises decoding the input  
4    with a second decoder to recover the first and second  
5    data, wherein the second decoder has eight states,  
6    wherein the producing of an output comprises choosing  
7    only one state out of four states of the eight states  
8    of the second decoder, and wherein the providing of the  
9    output comprises providing the one state as the  
10   enhanced slice prediction.

1           7.    The method of claim 6 further comprising  
2    delaying the choosing of the one state based upon a  
3    processing time of the second decoder.

1           8.    The method of claim 1 wherein the  
2    producing of an output comprises:  
3            decoding the input when the second data is  
4    not available so as to produce the output; and,  
5            decoding the second data when the second data  
6    is available so as to produce the output.

1           9.    The method of claim 8 further comprising  
2    delaying the decoding of the input based at least in  
3    part upon a processing time of the decoder.

1           10.   The method of claim 8 wherein the  
2    providing of the output as the enhanced slice  
3    prediction comprises providing only one state as the  
4    enhanced slice prediction.

1           11.   The method of claim 8 further comprising  
2    selecting between decoding the input and the second  
3    data in response to a received map.

1           12. The method of claim 8 wherein the first  
2 data comprises eight level non-RVSB symbols, and  
3 wherein the second data comprises eight level RVSB  
4 symbols.

1           13. The method of claim 8 wherein the  
2 providing of the output as the enhanced slice  
3 prediction comprises providing the enhanced slice  
4 prediction based upon a known training signal when a  
5 transmitted training signal is contained in a received  
6 signal.

1           14. The method of claim 1 wherein the  
2 decoder is a first decoder, wherein the receiving of an  
3 input comprises decoding the input with a second  
4 decoder to recover the first and second data, wherein  
5 the decoding of only the second data comprises decoding  
6 the second data with the first decoder to produce  
7 decoded second data, and wherein the producing of an  
8 output comprises;

9           producing the output by decoding the input  
10   with a third decoder when the decoded second data is  
11   not available; and,  
12           producing the output by decoding the second  
13   decoded data with the third decoder when the decoded  
14   second data is available.

1           15. The method of claim 14 further  
2   comprising delaying the decoding of only the input.

1           16. The method of claim 14 wherein the third  
2   decoder implements a Viterbi algorithm.

1           17. The method of claim 14 wherein the  
2   providing of the output as the enhanced slice  
3   prediction comprises providing only one state of the  
4   third decoder as the enhanced slice prediction.

1           18. The method of claim 14 further  
2   comprising selecting between decoding the input and the  
3   decoded second data in response to a received map.

1           19. The method of claim 14 wherein the first  
2 data comprises eight level non-RVSB symbols, and  
3 wherein the second data comprises eight level RVSB  
4 symbols.

1           20. The method of claim 14 wherein the  
2 providing of the output as the enhanced slice  
3 prediction comprises providing the enhanced slice  
4 prediction based upon a known training signal when a  
5 transmitted training signal is contained in a received  
6 signal.

1           21. The method of claim 1 further comprising  
2 providing the enhanced slice prediction as feedback to  
3 an equalizer.

1           22. The method of claim 1 further comprising  
2 providing the enhanced slice prediction as feedback to  
3 a phase tracker.

1           23. The method of claim 1 wherein the  
2 providing of the output as the enhanced slice  
3 prediction comprises providing the enhanced slice  
4 prediction based upon a known training signal when a  
5 transmitted training signal is contained in a received  
6 signal.

1           24. An apparatus for providing enhanced  
2 slice prediction comprising:  
3           an inner decoder that inner decodes a  
4 received signal to provide an inner decoded output,  
5 wherein the inner decoder produces  $n/2$  possible  
6 decoding states based upon the received signal, wherein  
7 the received signal contains data having  $n$  levels, and  
8 wherein  $n > 2$ ;  
9           an outer decoder that outer decodes the inner  
10 decoded output; and,  
11           an enhanced slice predictor that chooses at  
12 least one but fewer than the  $n/2$  of the  $n/2$  possible  
13 decoding states based upon an output of the outer



14 decoder and that provides the chosen state or states as  
15 the enhanced slice prediction.

1           25. The apparatus of claim 24 wherein n is  
2 eight, wherein the enhanced slice predictor chooses two  
3 of the four possible states based upon the output of  
4 the outer decoder, and wherein the enhanced slice  
5 predictor provides the chosen two states as the  
6 enhanced slice prediction.

1           26. The apparatus of claim 24 wherein n is  
2 eight, wherein the enhanced slice predictor chooses two  
3 and only two of the four possible states based upon the  
4 output of the second decoder, and wherein the enhanced  
5 slice predictor provides the chosen two and only two  
6 states as the enhanced slice prediction.

1           27. The apparatus of claim 24 wherein n is  
2 eight, wherein the enhanced slice predictor chooses one  
3 of the four possible states based upon the output of  
4 the outer decoder, and wherein the enhanced slice

5 predictor provides the chosen one state as the enhanced  
6 slice prediction.

1           28. The apparatus of claim 24 wherein n is  
2 eight, wherein the enhanced slice predictor chooses one  
3 and only one of the four possible states based upon the  
4 output of the second decoder, and wherein the enhanced  
5 slice predictor provides the chosen one and only one  
6 state as the enhanced slice prediction.

1           29. The apparatus of claim 24 further  
2 comprising a delay that delays operation of the  
3 enhanced slice predictor based upon a processing time  
4 of the inner decoder.

1           30. The apparatus of claim 24 wherein the  
2 inner decoder is an ATSC decoder, and wherein the outer  
3 decoder is an RVSB decoder.

1           31. The apparatus of claim 24 further  
2     comprising an equalizer coupled to receive the enhanced  
3     slice prediction as feedback.

1           32. The apparatus of claim 24 further  
2     comprising a phase tracker coupled to receive the  
3     enhanced slice prediction as feedback.

1           33. An apparatus for providing enhanced  
2     slice prediction comprising:

3           an inner decoder that inner decodes a  
4     received signal containing first and second data to  
5     provide inner decoded first and second data;

6           an outer decoder that outer decodes only the  
7     second data; and,

8           an enhanced slice predictor that provides a  
9     prediction output based upon the first data when the  
10    second data is not available and based upon the outer  
11    decoded second data when the second data is available.

1           34. The apparatus of claim 33 wherein the  
2 each of the first and second data are 8 level symbols  
3 having different bit rates.

1           35. The apparatus of claim 33 wherein the  
2 enhanced slice predictor implements a Viterbi  
3 algorithm.

1           36. The apparatus of claim 33 wherein the  
2 prediction output is a single symbol.

1           37. The apparatus of claim 33 further  
2 comprising a delay that delays operation of the  
3 enhanced slice predictor.

1           38. The apparatus of claim 33 wherein the  
2 first data are non-RVSB symbols, and wherein the second  
3 data are RVSB symbols.

1           39. The apparatus of claim 33 wherein the  
2 first decoder is an ATSC decoder, and wherein the  
3 second decoder is an RVSB decoder.

1           40. The apparatus of claim 33 further  
2 comprising an equalizer coupled to receive the enhanced  
3 slice prediction as feedback.

1           41. The apparatus of claim 33 further  
2 comprising a phase tracker coupled to receive the  
3 enhanced slice prediction as feedback.

1           42. The apparatus of claim 33 wherein the  
2 enhanced slice predictor bases its slice prediction  
3 upon a known training signal when a transmitted  
4 training signal is contained in a received signal.